

Industry-Wide Study Plan for TCW Fluid Characteristics: Study Plan Summary

Gulf of Mexico

USEPA Region 4 NPDES Permit No. GEG460000

USEPA Region 6 NPDES Permit No. GMG290000

**USEPA Region 4 and Region 6
April 4, 2019**

Agenda

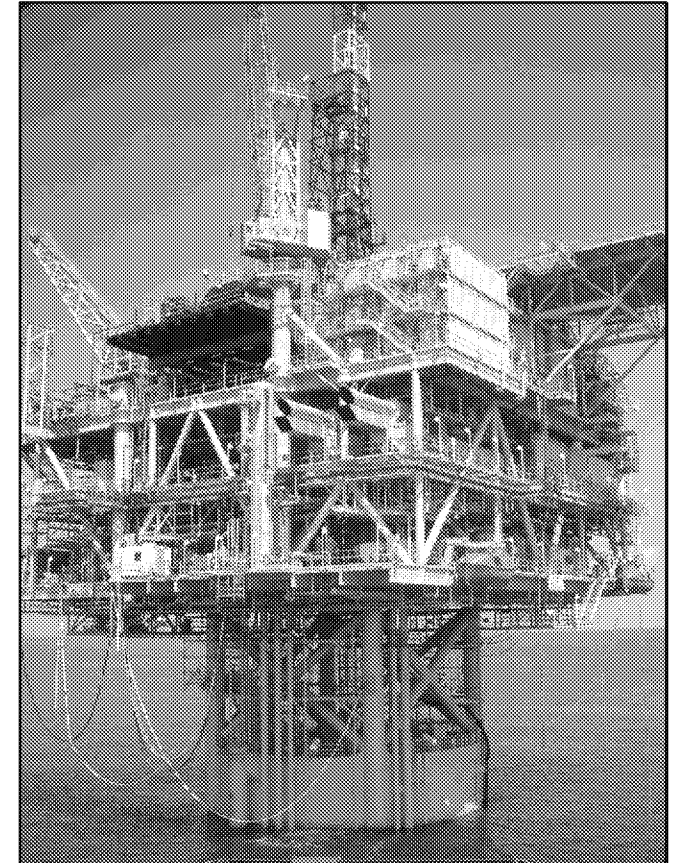
Time	Topic	Facilitator
10:00-10:05	Introductions/Project Organization	OOC
10:05-10:10	Presentation Purpose and Objectives	OOC
10:10-10:15	Study Questions	AECOM
10:15-10:25	Anticipated TCW Discharges	AECOM
10:25-12:30	Technical Approach: <ul style="list-style-type: none"> • Preliminary Evaluation • Data Collection and Laboratory Analysis • Data Evaluation 	AECOM
12:30-12:40	Reporting	AECOM
12:40-12:45	Study Schedule	AECOM/OOC
12:45-12:50	Summary	AECOM/OOC
12:50-1:30	Discussion	AECOM/OOC
1:30	Adjourn	—

Introductions

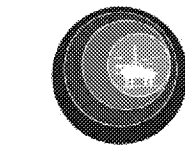
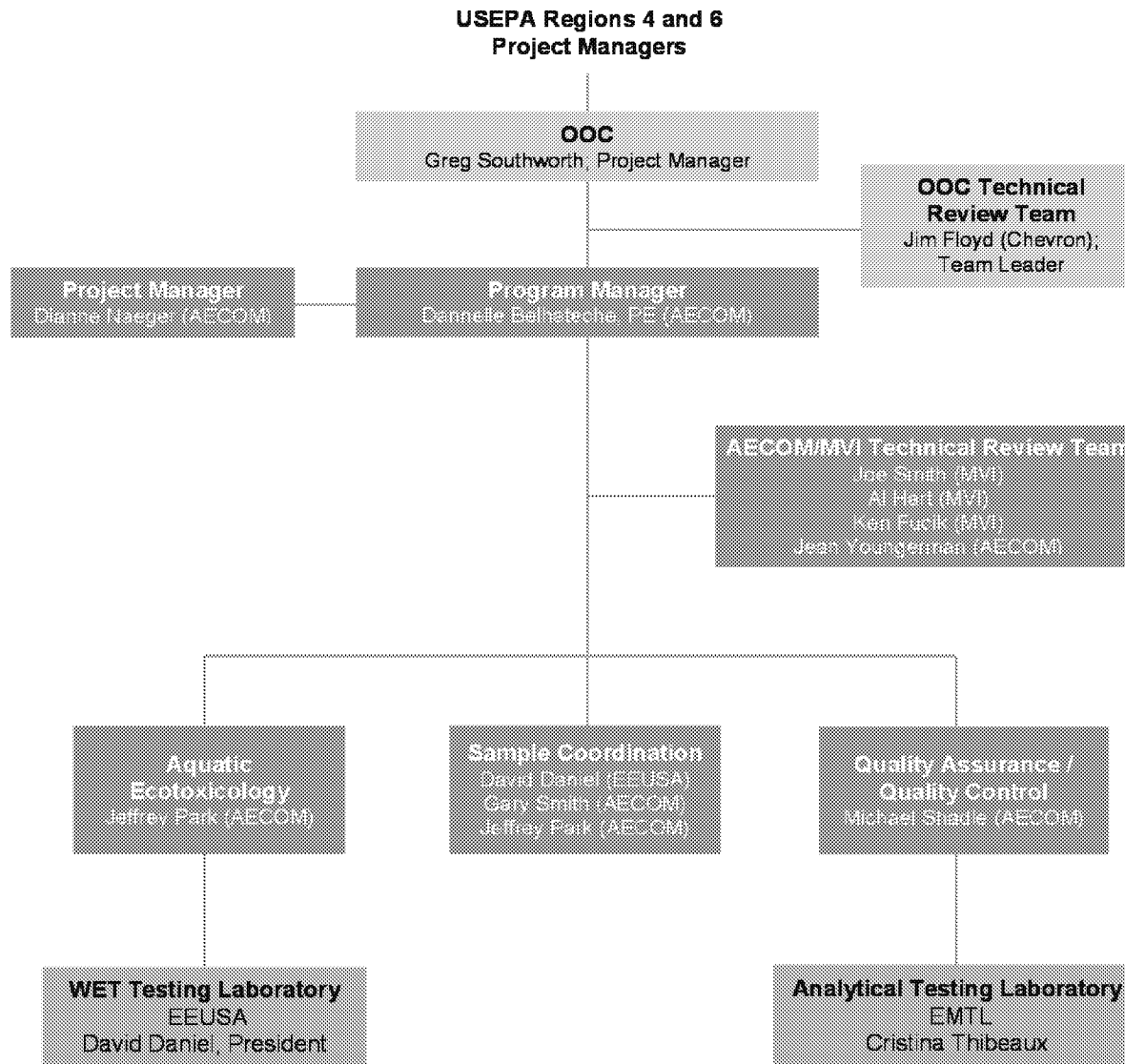
- Offshore Operators Committee (OOC).
- 28 JIP Study Participants.

Anadarko	Hess
Ankor Energy	LLOG
Arena Offshore	Marubeni
BP	Medco Energi
Byron Energy	Murphy E&P
Chevron	Newpark
Contango	Northstar
ENI US Operating	Petrobras America
EnVen	Shell
Equinor	Talos Energy Inc.
ExxonMobil	TETRA
Fieldwood	Total
Halliburton	W&T Offshore
Helis	Walter Oil & Gas

- USEPA Region 4 (R4).
- USEPA Region 6 (R6).
- Selected Consultant (AECOM).



Project Organization



Presentation Purpose and Objectives

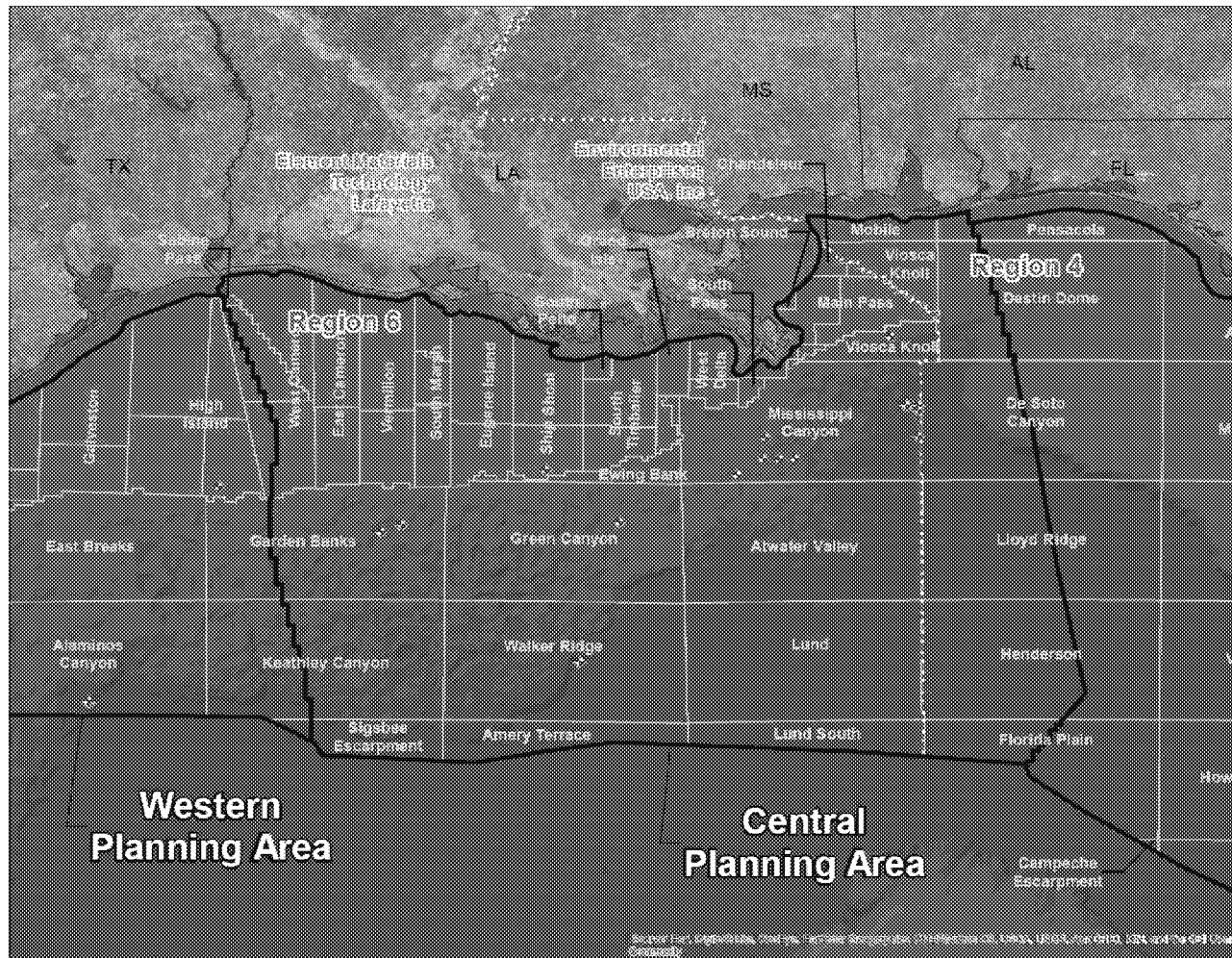
- **Purpose:** Summarize the draft Treatment, Completion, and Workover (TCW) study plan and initiate USEPA R4 and R6 review and approval of the study plan as required by the General Permits (GPs).
- **Objectives:**
 - Present the study questions.
 - Present preliminary information on anticipated TCW discharges.
 - Summarize the technical approach.
 - Summarize reporting requirements.
 - Present the project schedule.
 - Present an overall summary.
 - Discuss study plan elements.

Study Questions

- What are the characteristics of TCW fluids currently used in the GOM?
- How are TCW discharges to GOM surface waters managed?
- What is the typical chemical composition of TCW discharges?
- What are the estimated concentrations of constituents in TCW discharges?
- What is the potential for the constituents in TCW discharges to cause acute aquatic toxicity?
- Which constituents are likely to be associated with acute aquatic toxicity?

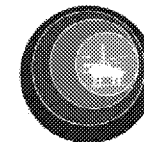


Anticipated TCW Discharges



◆ Operator Discharge Locations

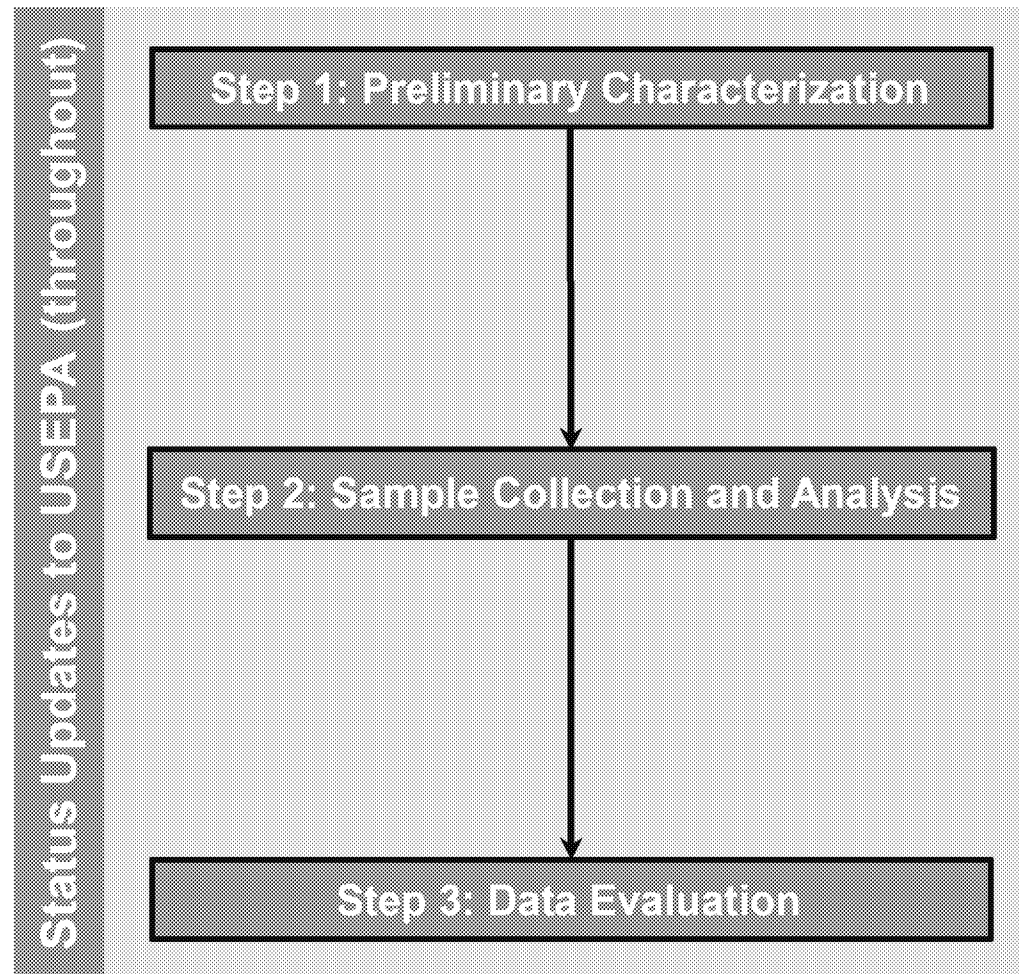
- Up to 50 discharges for Years 1 and 2.
- Category I-IV TCW fluids; biocides; defoamers.
- Some discharges are treated (filtration).
- Water column depth:
Aver.= 5,051 ft.; Min. = 375 ft.; Max.= 9,558 ft.
- Occur through either a pipe or hose (2-16 in. dia.).
- Short duration (<0.5-2 hrs.). Frequency can be once per well operation; weekly; monthly; and quarterly.



OPERATOR DISCHARGE LOCATIONS

AECOM

Technical Approach - Overview



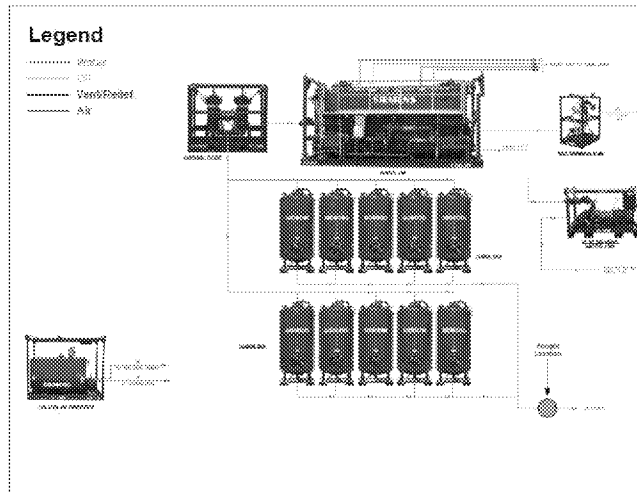
Once approved by USEPA, the study plan will become a binding part of the GP requirements.

Technical Approach – Preliminary Characterization

- Data sources:
 - JIP study participants.
 - Publicly available information:
 - Safety data sheets (SDSs).
 - Published reports and studies of offshore O&G activities.
 - Internet databases, e.g., OECD eChemPortal; USEPA ECOTOX; USEPA EPI Suite software.
- Data evaluation and summary:
 - Dominant constituents likely to be present in TCW fluids will be listed and a narrative summary will be prepared.
 - Aquatic hazard data will be compiled and summarized.

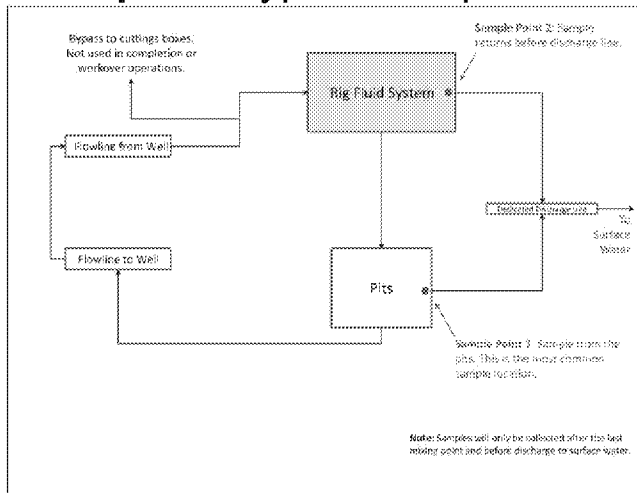
Technical Approach – Sample Locations

– Example 1. Typical sample location (with treatment):



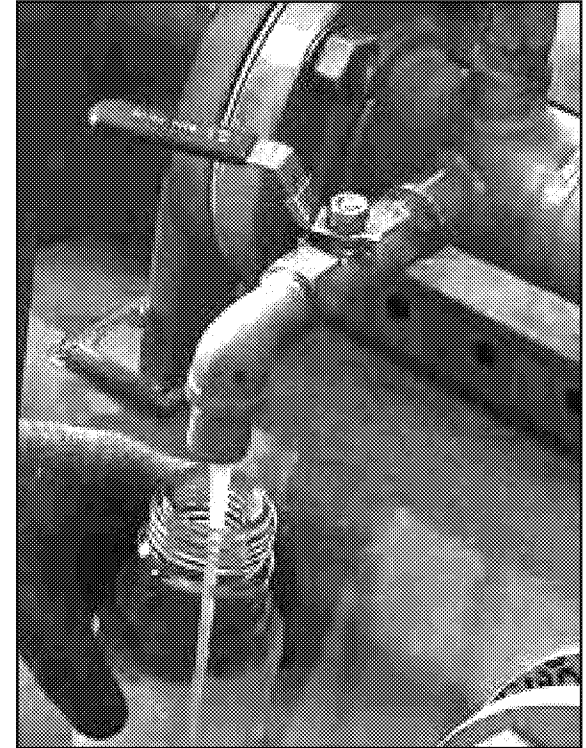
TCW discharges will be sampled after final treatment (where applicable) and before discharge to surface waters.

– Example 2. Typical sample location (without treatment):

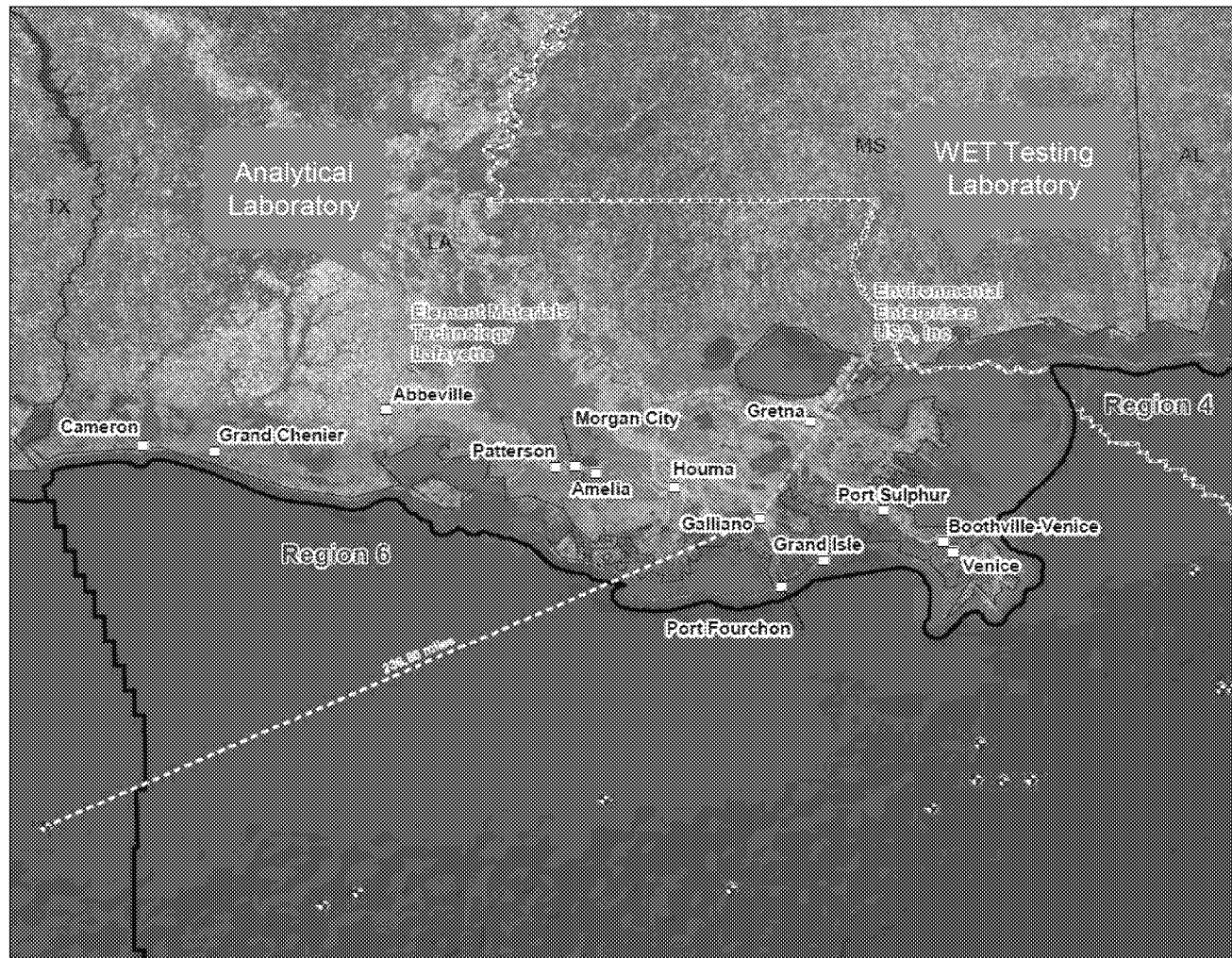


Technical Approach – Sample Collection

- Sampling is planned to start in Q2 2019.
- Samples will be collected for acute whole effluent toxicity (WET) testing and chemical analysis.
- Sampling methodology will be consistent across all discharges:
 - Samples will be collected on the discharge structure.
 - Grab samples will be collected from a discharge valve or sample port on the overboard discharge line.
 - Samples can be collected at the same time as the oil and grease sample.
 - The sample port will be flushed for 15 seconds into a sump/catch basin.
 - Samples will be collected at the beginning of the discharge.
 - May sample at the beginning/end of a longer duration TCW discharge for comparison.
- Quality Assurance/Quality Control (QA/QC) samples.



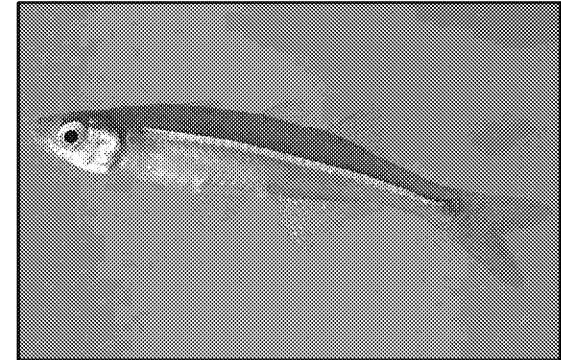
Technical Approach – Sample Handling and Shipping



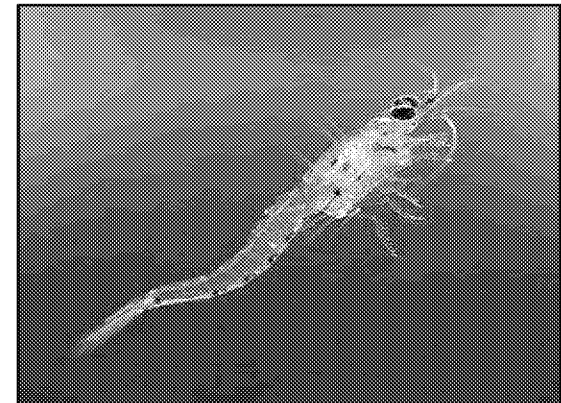
- Samples will be labeled for proper identification in the field and tracking in the laboratory.
- Samples will be packed and shipped by the Operators.
- Samples will be picked up from shore bases or received from parcel carrier.
- WET test hold time is 36 hours.

Technical Approach – Acute WET Testing

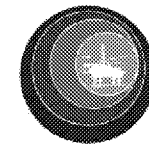
- WET test laboratory: Environmental Enterprises USA, Inc. (EEUSA).
- Assess the acute toxicity of the discharge:
 - Acute (48-hour) static-renewal test.
 - *Americamysis bahia* (Mysid shrimp) and *Menidia beryllina* (Inland silverside minnow).
 - The effluent dilution series will be constructed at/around the produced water critical dilutions consistent with the GPs.
 - Assessment endpoint: acute *A. bahia* and *M. beryllina* lethality. Acute WET test endpoints: USEPA R6: 48h NOEC and USEPA R4: 48h LC50.
 - The LC50 is generated with point estimation techniques; the NOEC is generated with hypothesis testing techniques. EEUSA can report additional WET test endpoints to complement the NOEC and LC50.
 - EEUSA will prepare aliquots of the critical effluent dilution for laboratory analysis.



Inland silverside minnow



Mysid shrimp



AECOM

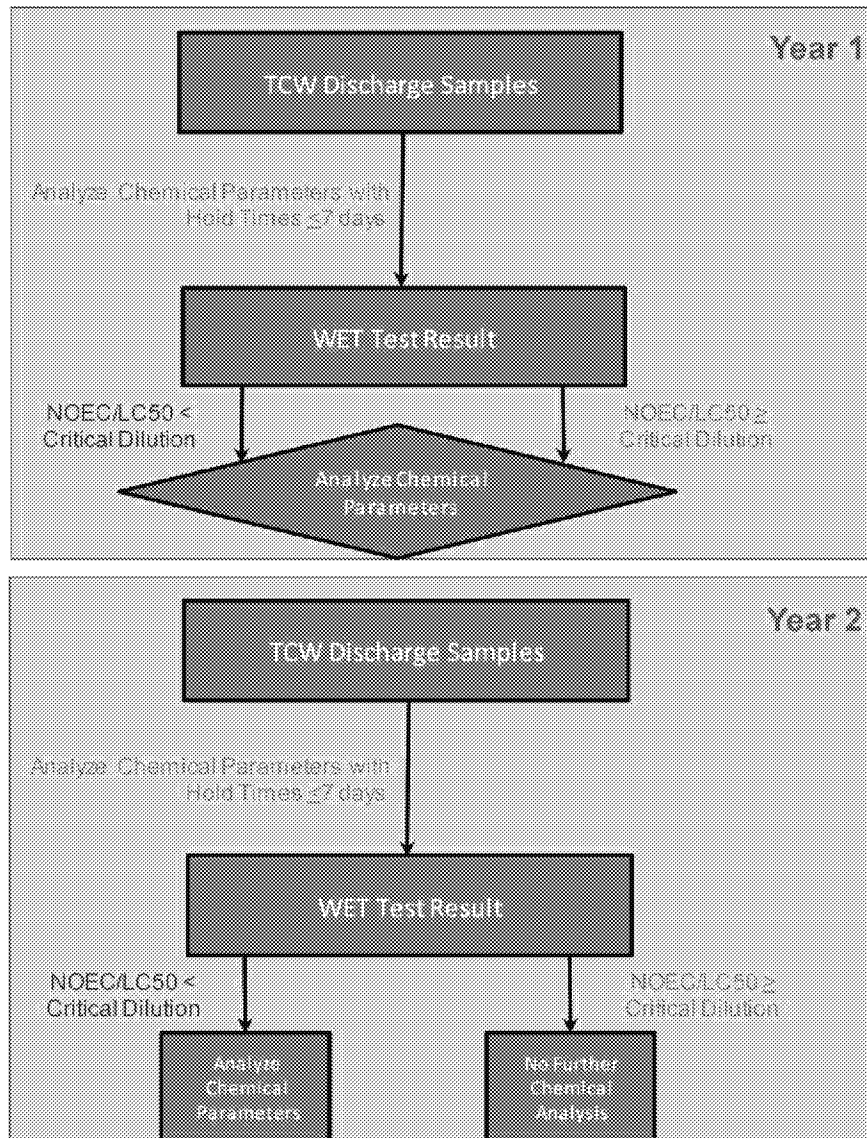
Technical Approach – Laboratory Analytical

- Analytical laboratory: Element Materials Technology Lafayette (EMTL).
- Chemical analyses will be conducted on aliquots prepared by EEUSA at the critical effluent dilution.
- Selected laboratory parameters will possess one or more of the following characteristics:
 - Support JIP study data quality objectives (DQOs);
 - Representative of the types of constituents likely to be present in TCW discharges;
 - On the USEPA Priority Pollutant List (40 CFR Part 423, Appendix A); and
 - Have published USEPA acute aquatic life criteria and/or USEPA-approved data, including species-specific benchmarks for the selected WET test organisms.

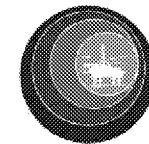
Technical Approach – Laboratory Analytical

- Flexibility to select parameters during the study is desired. This will promote the collection of high-quality data.
- Parameter lists will be consistent across discharges.
- Parameters mentioned in the study plan include:
 - Organics with a known potential to cause aquatic toxicity, e.g., 16 Priority Pollutant parent polycyclic aromatic hydrocarbons (PAHs);
 - Total/dissolved Priority Pollutant metals;
 - Select ions (cations/anions); and
 - Water quality parameters that influence aquatic toxicity/bioavailability, e.g., alkalinity, hardness, pH, dissolved organic carbon (DOC), ammonia, and hydrogen sulfide.

Technical Approach – Adaptive Approach



- A representative suite of analyses will be performed during the first consecutive 12 months of the study.
- The Year 1 analytical data sets can be used to assess spatial and other patterns in toxicity and constituent concentrations.
- The Year 1 findings will be used to refine the Year 2 laboratory analyses with an adaptive approach.
 - For example, samples that do not exhibit acute toxicity will not be analyzed. Other Year 2 refinements may be necessary, however, based upon the 2019 findings.



OPERATIONS COMPANY

AECOM

Technical Approach – Data Evaluation

- Acute toxicity screening:
 - Concentrations at the critical effluent dilution will be evaluated with the following hierarchy:
 - Acute species-specific effects benchmarks.
 - Published acute saltwater aquatic life criteria.
- The potential for acute aquatic toxicity may be expressed with a hazard quotient (HQ) where $HQ < 1$ indicates toxicity not probable and $HQ \geq 1$ indicates the parameter may be associated with acute toxicity.
- Assessing potential sources of acute toxicity:
 - Use constituents with acute $HQs \geq 1$ as a starting point.
 - Data review: operations and maintenance information; TCW fluid SDS sheets; and safety data sheets for chemical additives known to be acutely toxic, e.g., biocides.
 - Additional chemical analysis and acute WET testing are not proposed.

Reporting

- Status reports:
 - Submitted to USEPA on a quarterly basis.
 - Describe activities conducted during the previous three months.
 - Discuss any observations that may have an effect on future sampling operations.
 - Provide a summary of samples collected and resources expended on sampling activities.
- Final study report:
 - Will address study questions regarding TCW discharge quality and the potential for TCW discharges to cause acute aquatic toxicity. General report elements will include (where applicable):
 - Summary of likely constituents in TCW fluids, including aquatic hazard characteristics;
 - Summary of WET testing and laboratory analytical data;
 - Data evaluations; and
 - Laboratory reports.

Study Schedule

Study Plan Element	Anticipated Completion Date
USEPA Review and Approval of Study Plan	Q2 2019
Step 1: Preliminary Characterization	Q2 2019
Step 2: Sample Collection and Analysis Step 3: Data Evaluation	Q2 2019 – Q4 2020
Final Study Report to USEPA	October 1, 2021
Status Reports to USEPA	Throughout on a quarterly basis

Summary

- Once approved by USEPA, the study plan will become a binding part of the GP requirements.
- Samples will be collected for acute WET testing and laboratory analytical testing.
- Sampling of TCW discharges will start in Q2 2019 and will likely terminate in Q4 2020.
- Samples will represent a range of well depths, rock formations, TCW fluid use, and the use of other chemical additives.
- The data will be used to characterize the TCW discharges and assess the potential for aquatic toxicity (if observed).
- The data will also be used to support source characterization, if acute aquatic toxicity is observed.
- Status reports will be submitted quarterly. A final study report will be submitted to USEPA on October 1, 2021.

Discussion

- Study plan technical approach:
 - Preliminary evaluation.
 - Sample collection.
 - Sample analysis.
 - Data analysis.
- Study plan schedule.
- Reporting.
- Other.



Adjourn